

Claims

- [c1] 1. A metal–insulator–metal (MIM) capacitor, comprising:
- a first metal plate;
 - a first capacitor dielectric layer disposed on the first metal plate;
 - a second metal plate stacked on the first capacitor dielectric layer, wherein the first metal plate, the first capacitor dielectric layer, and the second metal plate constitute a lower capacitor;
 - a second capacitor dielectric layer disposed on the second metal plate; and
 - a third metal plate stacked on the second capacitor dielectric layer, wherein the second metal plate, the second capacitor dielectric layer, and the third metal plate constitute an upper capacitor;
- and wherein the first metal plate and the third metal plate are electrically connected to a first terminal of the MIM capacitor, while the second metal plate is electrically connected to a second terminal of the MIM capacitor.
- [c2] 2. The MIM capacitor according to claim 1 wherein the second metal plate has a surface area that is smaller than that of the first metal plate.

- [c3] 3.The MIM capacitor according to claim 1 wherein the third metal plate has a surface area that is smaller than that of the second metal plate.
- [c4] 4.The MIM capacitor according to claim 1 wherein the first capacitor dielectric layer is made of PECVD dielectric.
- [c5] 5.The MIM capacitor according to claim 1 wherein the second capacitor dielectric layer is made of PECVD dielectric.
- [c6] 6.The MIM capacitor according to claim 1 wherein the second metal plate has a thickness that is thinner than that of the first metal plate.
- [c7] 7.The MIM capacitor according to claim 6 wherein the second metal plate has a thickness of about 1000 angstroms.
- [c8] 8.The MIM capacitor according to claim 6 wherein the second metal plate comprises titanium.
- [c9] 9.A method for fabricating a metal-insulator-metal (MIM) capacitor, comprising the steps of:
providing a substrate;
forming, in the order of, a first metal layer, a first dielectric layer, a second metal layer, a second dielectric layer,

a third metal layer, and a cap layer over the substrate; etching the cap layer, the third metal layer, the second dielectric layer, the second metal layer, and the first dielectric layer to form an upper capacitor structure consisting of a second metal plate, a second capacitor dielectric layer, and third metal plate; partially covering the upper capacitor structure with a photo mask that defines a first metal plate to be formed in the underlying first metal layer; simultaneously etching the first metal layer, a portion of the cap layer atop the second metal plate and the second metal plate of the upper capacitor structure that are not covered by the photo mask; and stripping the photo mask.

[c10] 10. The method according to claim 9 wherein the second metal plate has a thickness that is thinner than that of the first metal plate.

[c11] 11. The method according to claim 10 wherein the second metal plate has a thickness of about 1000 angstroms, and the first metal plate has a thickness of about 5000 angstroms.

[c12] 12. The method according to claim 9 wherein the first and second capacitor dielectric layer are both made of PECVD dielectric.

